TRENDS IN
NEUROSCIENCES

REFERENCE EDITION

Volume 11

1988

CONTENTS

JANUARY

Research News
Cloning the calcium channel, *by John P. Alsobrook II and Charles F. Stevens* 1
G proteins flex their muscles, *by Richard J. Miller* 3
Immortalization of neural cells via oncogene transduction, *by Constance Cepko* 6

Perspectives
Logical neurons: the enigmatic legacy of Warren McCulloch, *by Donald H. Perkel* 9

Perspectives on Disease
Treatment strategies for senile dementia: antagonist β-carbolines, *by Martin Sarter, Herbert H. Schneider and David N. Stephens* 13

Letter to the Editor
Acidic amino acid receptor nomenclature: time for change, *by Alan C. Foster and Graham E. Fagg* 17

Reviews
Neuromuscular specificity: pathfinding by identified motor growth cones in a vertebrate embryo, *by Monte Westerfield and Judith S. Eisen* 18
The molecular biology of human glial tumors, *by Robert L. Martuza, Bernd R. Seizinger, Lee B. Jacoby, Guy A. Rouleau and James F. Gusella* 22
Paramecium: a model system for the study of excitable cells, *by Robert D. Hinrichsen and Joachim E. Schultz* 27
Pursuit of the mechanisms of kindling, *by James O. McNamara* 33
Phencyclidine and psychotomimetic sigma opiates: recent insights into their biochemical and physiological sites of action, *by Mark S. Sonders, John F. W. Keana and Eckard Weber* 37

Books Received 40

FEBRUARY

Research News
Cloning of serotonin and substance K receptors by functional expression in frog oocytes, *by Edwin S. Levitan* 41
Viruses, the immune system and central nervous system diseases, *by W. I. Lipkin, K. L. Tyler and B. H. Waksman* 43

Viewpoint
What do chimaeras tell us about cell lineages in the mammalian CNS?, *by Charles G. B. Jennings* 46
What do genetic mosaics tell us about cell lineages in the mammalian CNS? a reply, *by Karl Herrup* 49

Perspectives on Disease
Amyotrophic lateral sclerosis and Parkinson's disease complex on Guam linked to an environmental neurotoxin, *by Leonard T. Kurland* 51

Reviews
The sexual differentiation of social play, *by Michael J. Meaney* 54
Atrial natriuretic factors and the brain: an update, *by Rémi Quirion* 58
Generalized epilepsy: some of its cellular mechanisms differ from those of focal epilepsy, *by P. Gloor and R. G. Fariello* 63
Calcium-activated non-specific cation channels, *by L. D. Partridge and D. Swandulla* 69
Characterization of neuronal nicotinic receptors by snake venom neurotoxins, *by Ralph H. Loring and Richard E. Zigmond* 73
Cat spatial vision, *by Randolph Blake* 78

Books
Neurobiology of Taste and Smell (by Thomas E. Finger and Wayne L. Silver), *by Robert R. H. Anholt* 83
Rehabilitation of Memory (by Barbara A. Wilson), *by Stuart Zola-Morgan* 84
Neuromodulation: The Biochemical Control of Neuronal Excitability (by Leonard K. Kaczmarek and Irwin B. Levitan), *by Alain Marty* 85

MARCH

Research News
Dendritic maturation of retinal ganglion cells, *by Heinz Wässle* 87
Mouse models of human neurogenetic disorders, *by John Hardy* 89
New insights into the molecular structure of the dihydropyridine-sensitive calcium channel, *by Stanley C. Froehner* 90
Transient expression of neurotransmitters in the developing neocortex, *by J. G. Parnavelas and M. E. Cavanagh* 92

Viewpoint
Is there a correlation between continuous neurogenesis and directed axon regeneration in the vertebrate nervous system?, *by Nigel Holder and J. D. W. Clarke* 94

Letter to the Editor
Endogenous benzodiazepines in brain: right or wrong?, *by R. Camsonne* 100

Reviews
Segmentation and homeotic gene function in the developing nervous system of *Drosophila*, *by Chris Q. Doe and Matthew P. Scott* 101
Insulin and insulin-like growth factors in the CNS, *by Denis G. Baskin, Barbara J. Wilcox, Dianne P. Figlewicz and Daniel M. Dorsa* 107
Electrophysiology of $GABA_A$ and $GABA_B$ receptor subtypes, *by Joachim Bormann* 112
Receptor-mediated activation of phospholipase A_2 via GTP-binding proteins: arachidonic acid and its metabolites as second messengers, *by Julius Axelrod, Ronald M. Burch and Carole L. Jelsema* 117

Books
The Neural and Molecular Bases of Learning (edited by J. P. Changeux and M. Konishi), *by Y. Fregnac* 123

APRIL
Special Issue

Introduction
The neuroscience of learning and memory: cells, neural circuits and memory, *by Richard G. M. Morris, Eric R. Kandel and Larry R. Squire* 125

Reviews
Is contiguity detection in classical conditioning a system or a cellular property? Learning in *Aplysia* suggests a possible molecular site, *by Thomas W. Abrams and Eric R. Kandel* 128
Cellular and molecular analysis of associative learning and memory in *Hermissenda, by Terry Crow* 136
The anatomy of a memory: convergence of results across a diversity of tests, *by William T. Greenough and Craig H. Bailey* 142
The neural basis for motor learning in the vestibulo-ocular reflex in monkeys, *by S. G. Lisberger* 147
The neural basis of basic associative learning of discrete behavioral responses, *by Richard F. Thompson* 152
Physiological mechanisms underlying long-term potentiation, *by Bengt Gustafsson and Holger Wigström* 156
Spatial learning and memory processes: the search for their neurobiological mechanisms in the rat, *by C. A. Barnes* 163
Memory: brain systems and behavior, *by Larry R. Squire and Stuart Zola-Morgan* 170
Cognitive psychology and human memory, *by Alan Baddeley* 176

Books Received 181

MAY

Research News
A neurite outgrowth-promoting molecule in developing fiber tracts, *by Fritz G. Rathjen* 183
Shaker shakes out potassium channels, *by Christopher Miller* 185
Potassium channels – what can the protein chemistry contribute?, *by J. Oliver Dolly* 186
How do you smell? Principle in question, *by Vincent E. Dionne* 188
Spatial patterns of homeobox gene expression in the developing mammalian CNS, *by Claudio D. Stern and Roger J. Keynes* 190
The lateral geniculate nucleus strikes back, *by Kevan A. C. Martin* 192

Perspectives
Rules and connections in human language, *by Alan Prince and Steven Pinker* 195

Perspectives on Disease
New insights into the pathophysiology of Parkinson's disease: the challenge of positron emission tomography, *by Joel S. Perlmutter* 203

Letters to the Editor
β-Carbolines for Alzheimer's disease? – more evidence, a test of efficacy and some precautions, *by Andrew W. Procter and David M. Bowen* 208
Neuronal loss and GABAergic innervation in the basal forebrain, *by Norbert Ulfig* 209
Is treating memory impairment in Alzheimer's disease an objective?, *by Karl L. R. Jansen* 210
Reply from Sarter and colleagues 211

Obituary
Stephen M. Schuetze (1951–1987), *by Martin Chalfie and Steven A. Siegelbaum* 212

Reviews
The plasticity of ion channels: parallels between the nervous and immune systems, *by Richard S. Lewis and Michael D. Cahalan* 214
Concurrent processing streams in monkey visual cortex, *by E. A. DeYoe and D. C. Van Essen* 219
Behavioral recovery following spinal transection: functional regeneration in the lamprey CNS, *by Avis H. Cohen, Scott A. Mackler and Michael E. Selzer* 227
Up- and down-modulation of single K^+ channel function by distinct second messengers, *by Francesco Belardetti and Steven A. Siegelbaum* 232

Book Reviews
Synaptic Function (by Gerald M. Edelman, W. Einar Gall and W. Maxwell Cowan), *by L. K. Kaczmarek* 238
New Concepts in Cerebellar Neurobiology (by James S. King), *by F. Crepel* 239
Phosphoproteins in Neuronal Function (by W. H. Gispen and A. Routtenberg) *by S. R. Nahorski* 240

JUNE

Research News
Molecular biology of synaptic vesicle-associated proteins, *by William S. Trimble and Richard H. Scheller* 241
The emerging generality of the neurotrophic hypothesis, *by Alun M. Davies* 243
Representation in the hippocampus: what do hippocampal neurons code?, *by Howard Eichenbaum and Neal J. Cohen* 244
The axonal cytoskeleton: stationary or moving matrix?, *by James R. Bamburg* 248

Techniques
The use of *Xenopus* oocytes to probe synaptic communication, *by Terry P. Snutch* 250

Letters to the Editor
Alois Alzheimer, *by Georg W. Kreutzberg and Wolfgang Gudden* 256
Reply from Thomas and Isaac 257
Growth cone movement, *by Daniel J. Goldberg and Donald W. Burmeister* 257

Reviews
Control of cell fates within equivalence groups in *C. elegans, by Paul W. Sternberg* 259
A reappraisal of the functions of the nucleus basalis of Meynert, *by Russell T. Richardson and Mahlon R. DeLong* 264
Tonotopic organization of the insect auditory pathway, *by Brian Phillip Oldfield* 267
The role of divalent cations in potassium channels, *by Ted Begenisich* 270
Macrophages and microglia in the nervous system, *by V. Hugh Perry and Siamon Gordon* 273
Spider toxins as tools for dissecting elements of excitatory amino acid transmission, *by H. Jackson and P. N. R. Usherwood* 278

Book Reviews
Memory and Brain (by Larry R. Squire), *by Andrew Mayes* 283
Mathematical Aspects of Hodgkin–Huxley Neural Theory (by Jane Cronin), *by Christof Koch* 284
Dopamine Receptors (edited by I. Creese and C. M. Fraser), *by Philip Beart* 285

JULY

Research News
Is p21-ras a real G protein?, *by Annette C. Dolphin* 287
Neurofilament protein phosphorylation – where, when and why, *by Andrew Matus* 291
Molecular biology and Alzheimer's disease: more questions than answers, *by John Hardy* 293
M-currents: an update, *by David Brown* 294

Viewpoint
Expression and possible function of nerve growth factor receptors on Schwann cells, *by Eugene M. Johnson, Jr, Megumi Taniuchi and Peter S. DiStefano* 299

Perspectives
The significance of neuroscience for philosophy, *by Patricia Smith Churchland* 304

Letter to the Editor
Means to immortalize neural cells, *by Neil Smalheiser* 307

Reviews
Anatomy of CNS opioid receptors, *by Alfred Mansour, Henry Khachaturian, Michael E. Lewis, Huda Akil and Stanley J. Watson* 308
Calcium regulation of the neuronal growth cone, *by Stanley B. Kater, Mark P. Mattson, Christopher Cohan and John Connor* 315
Human β_1- and β_2-adrenergic receptors: structurally and functionally related receptors derived from distinct genes, *by Thomas Frielle, Brian Kobilka, Robert J. Lefkowitz and Marc G. Caron* 321
The sodium pump becomes a family, *by Douglas M. Fambrough* 325
The modulation of human reflexes during functional motor tasks, *by Richard B. Stein and Charles Capaday* 328

AUGUST

Research News
Growth cone guidance and pathway formation, *by Judith S. Eisen* 333
Inositol phosphates: a family of signal molecules?, *by C. P. Downes* 336
Inositol polyphosphates regulate excitability, *by Laura A. Fink and Leonard K. Kaczmarek* 338
Regeneration of sensory hair cells in the vertebrate inner ear, *by Gavin J. Swanson* 339
RNA transport in dendrites, *by Phillip R. Gordon-Weeks* 342

Viewpoint
What, if anything, is a neurotrophic factor?, *by Y–A. Barde* 343

Techniques
Confocal microscopy: applications in neurobiology, *by A. Fine, W. B. Amos, R. M. Durbin and P. A. McNaughton* 346

Reviews
Visual course control in flies relies on neuronal computation of object and background motion, *by Martin Egelhaaf, Klaus Hausen, Werner Reichardt and Christian Wehrhahn* 351
Postural control in weightlessness: a dual process underlying adaptation to an unusual environment, *by Francis G. Lestienne and Victor S. Gurfinkel* 359
Multiple modes and sites for the induction of axonal growth, *by Shlomo Rotshenker* 363
Schizophrenia and the frontal lobe, *by Daniel R. Weinberger* 367

Books in Brief
Neural Plasticity: A Lifespan Approach (edited by Ted L. Petit and Gwen O. Ivy), *by Stephen Dunnett* 371
The Benzodiazepine Receptor (by Walter E. Müller), *by Ian L. Martin* 371
Neural Repair (edited by J. Nicholls and J. Treherne), *by M. C. Brown* 371
Molecular Neurobiology: Recombinant DNA Approaches (by S. Heinemann and J. Patrick), *by Huntington Potter* 371
The Cytoskeleton in Cell Differentiation and Development (edited by Ricardo B. Maccioni and Juan Arachaga), *by Dennis Bray* 371
In Situ Hybridization (edited by D. Valentino, J. Eberwine and J. Barchas), *by Scott Young* 372
Growth and Plasticity of Neural Connections (edited by W. Winlow and C. R. McCrohan), *by Craig H. Bailey* 372

Books Received 372

SEPTEMBER

Research News
Representation of form in the somatosensory system, *by T. P. Pons* 373
How do seizures begin? Clues from hippocampal slices, *by Charles P. Taylor* 375
Genetic control of neuronal determination in insects, *by Fernando Jiménez* 378

Perspectives
From enzymes to visual perception: a bridge too far?, *by Kevan A. C. Martin* 380

Letter to the Editor
A comment on the classification and nomenclature of phencyclidine and sigma receptor sites, *by J. A. Kemp, A. C. Foster, E. H. F. Wong and D. N. Middlemiss* 388
Reply from Quirion *et al.* 388

Reviews
Down syndrome, Alzheimer's disease and the trisomy 16 mouse, *by Joseph T. Coyle, Mary Lou Oster-Granite, Roger H. Reeves and John D. Gearhart* 390
Probing visual cortical function with discrete chemical lesions, *by William T. Newsome and Robert H. Wurtz* 394
Cellular interactions during early neurogenesis of *Drosophila melanogaster, by Jose A. Campos-Ortega* 400
Amacrine cells, by *Richard H. Masland* 405

Book Reviews
Neurotransmitters in Epilepsy (edited by P. C. Jobe and H. E. Laird, II), *by John G. R. Jefferys* 410
Medicine, Mind, and the Double Brain (by Anne Harrington), *by Bruce Volpe* 411
Biological Perspectives of Schizophrenia (edited by H. Helmchen and F. A. Henn), *by A. Bassett* 411
Advances in Headache Research (edited by F. Clifford Rose), *by J. W. Lance* 412
The Retina: An Approachable Part of the Brain (by John Dowling), *by Heinz Wässle* 413

Books in Brief
The Measurement of Depression (edited by A. J. Marsella, R. M. A. Hirschfeld and M. M. Katz), *by William T. McKinney* 413

OCTOBER
Special Issue – Calcium and Neuronal Excitability

Introduction
Calcium signalling in neurons, *by Richard J. Miller* 415

Reviews
Fluorescence measurement and photochemical manipulation of cytosolic free calcium, *by Roger Y. Tsien* 419
The biochemistry and molecular biology of the dihydropyridine-sensitive calcium channel, *by Kevin P. Campbell, Albert T. Leung and Alan H. Sharp* 425
Multiple types of neuronal calcium channels and their selective modulation, *by R. W. Tsien, D. Lipscombe, D. V. Madison, K. R. Bley and A. P. Fox* 431
Calcium transport and buffering in neurons, *by Mordecai P. Blaustein* 438
Inositol polyphosphates and neuronal calcium homeostasis, *by Stefan R. Nahorski* 444
The intracellular distribution of calcium, *by Jacopo Meldolesi, Pompeo Volpe and Tullio Pozzan* 449
Ryanodine receptor channel of sarcoplasmic reticulum, *by Michael Fill and Roberto Coronado* 453
Calcium ions, active zones and synaptic transmitter release, *by Stephen J Smith and George J. Augustine* 458
Calcium-mediated neurotoxicity: relationship to specific channel types and role in ischemic damage, *by Dennis W. Choi* 465

Books Received 469

NOVEMBER

Research News
Carrier-bound odorant delivery to olfactory receptors, *by Peter R. Schofield* 471
Drosophila adhesion molecules and neural development, *by Hilary Anderson* 472
Intracellular Mg^{2+} may act as a co-factor in ion channel function, *by P. R. Stanfield* 475
Immature and mature variants of MAP2 and tau proteins and neuronal plasticity, *by J. Nunez* 477

News Brief
Friedreich's ataxia gene localized to chromosome 9, *by John Hardy* 479

Perspectives
Molecular biology of Duchenne muscular dystrophy, *by Robert H. Brown, Jr and Eric P. Hoffman* 480

Techniques
Organotypic cultures of neural tissue, *by B. H. Gähwiler* 484

Letters to the Editor
Diazepam and *N*-desmethyldiazepam in plant food and in brain, *by Angel L. de Blas* 489
Endogenous benzodiazepines in brain: right or wrong?, *by E. Unseld, D. R. Krishna, C. Fischer and U. Klotz* 490

Reviews
Taste transduction: a diversity of mechanisms, *by Sue C. Kinnamon* 491
5-Hydroxytryptamine receptor subtypes: molecular, biochemical and physiological characterization, *by Stephen J. Peroutka* 496
The output map of the primate motor cortex, *by Roger Lemon* 501
The command hypothesis: a new view using an old example, *by James L. Larimer* 506

Book Reviews
Guide to Molecular Cloning Techniques (edited by Shelby L. Berger and Alan R. Kimmel), *by Mark G. Darlison* 510
Neural Darwinism (by Gerald M. Edelman), *by David Willshaw* 511
Duality and Unity of the Brain (edited by David Ottoson), *by Daniel Tranel* 512

DECEMBER

Research News
Genes for neural differentiation, *by John Palka and Margrit Schubiger* 515

Viewpoint
Intracellular Ca^{2+} activates phospholipase C, *by David A. Eberhard and Ronald W. Holz* 517

Perspectives
Cajal and the retina: a 100-year retrospective, *by Marco Piccolino* 521

Perspectives on Disease
Tropical myeloneuropathies – a new aetiology, *by Pamela E. Rodgers-Johnson, Ralph M. Garruto and D. Carleton Gajdusek* 526

Letters to the Editor
Are we really studying olfactory transduction?, *by Stephen G. Shirley and C. Jane Robinson* 532
Trophic role of neurotransmitters, *by Roger Barker* 533
Induction of hair cell formation in the vertebrate inner ear, *by Bernd Fritzsch* 533
Reply from Swanson 534

Reviews
Altering the mammalian circadian clock with the short-acting benzodiazepine, triazolam, *by Fred W. Turek and Olivier Van Reeth* 535
Cell-derived proteases and protease inhibitors as regulators of neurite outgrowth, *by Denis Monard* 541
A new mechanism for glutamate receptor action: phosphoinositide hydrolysis, *by Fritz Sladeczek, Max Récasens and Joël Bockaert* 545
Variable organization in cortical maps of the skin as an indication of the lifelong adaptive capacities of circuits in the mammalian brain, *by J. T. Wall* 549
Ion channels as a source of behavioral diversity: doing more with less in 'simpler' organisms, *by Michael E. Barish* 558

Book Reviews
Imprinting and Cortical Plasticity: Comparative Aspects of Sensitive Periods (edited by Josef P. Rauschecker and Peter Marler), *by Steven P. R. Rose* 561
Emil Kraepelin Memoirs (edited by H. Hippius, G. Peters and D. Ploog), *by T. J. Crow* 562
Nineteenth-century Origins of Neuroscientific Concepts (by Edwin Clarke and L. S. Jacyna), *by M. Glickstein* 563